and geographical view than does J and the school of writers that follow him. Lastly, it is to be noted that the writers responsible for the numerous additions and glosses to J as well as the compiler who combined J with P stand under the influence of the narrower view manifested by J, so that in its present form the *Völkertafel* in the tenth chapter of Genesis regarded as a "combined" document impresses one as bearing out J's conception of Hamites and Shemites, the former as the "accursed," the latter as those "blessed" by Jahweh, rather than P's definition. Nor is it surprising, in view of political events and religious developments in the post-exilic period, that the more rigidly "scholastic" division of nations should have been eclipsed by one that appealed more to the national interests and that must have been a source of hope and consolation in trying days—encouraging the Hebrews to look forward to a time when the "curse" and "blessing" pronounced on Ham and Shem, or Canaan and Eber, respectively, would be fulfilled.

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REGULATION OF COLOR-SIGNALS IN MARINE AND NAVAL SERVICE.

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When it is considered that the most dangerous periods of time for the safety of lives and preservation of property at sea are those during which the proper recognition of color-signals constitutes the main and, at times, the only guide for immediate action, the importance of the regulation of the choice of the colors used, the character of the materials employed, the size of the objects submitted for inspection, and the degree and the character of the visual acuity necessary for the determination of such colors, become evident.

So long as the high seas are necessarily free, and harbors constantly changing in topography and ofttimes difficulty of access; rivers and streams occupied in similar places by crafts of varied size and differing speeds; permanently fixed objects, such as buoys and direction and danger indicators, must have color differentiation employed as their main expressive feature; and color-signs must be used to signify the position of large floating masses, such as ships at

anchor,—just so long will it remain necessary continually to improve the color material employed during actual service, and to render the apparatus which is to be used the most simple in construction that can be employed.

The well-filled harbor, with its changeable and constantly crossing paths containing traffic of every conceivable kind, the instability of the water mass itself, and the uncertain factors, such as fogs, mists and snow, all show to what great degree of danger every moving object placed within such a situation is exposed. These conditions are far different in degree of uncertainty from those that are seen in railway travel, in which the directions of movement are comparatively fixed, every change of direction well protected, and all of the trains carefully guarded by block systems.

The first question which arises is, Can the system of signalling now in vogue in marine and naval service be so changed as to give better results with less liability to error?[1]

Experiment and trial have shown that the visual apparatus which projects man's ordinary sensory powers possibly to the greatest distance into space must be the sensory organ which is preferably to be employed during the common routine of duty. Fixed or intentionally changed color differentiations being less unstable, and hence more certain for visual perception than mere recognition of form and objective motion, must be that which should be practically employed. As the result of experience, the coarse colors, red, green, yellow, white and blue, are the ones which have been found to be the best for use during maritime signalling. These colors which are either placed in related situations upon movable bodies (both while in motion and while at rest upon bodies of water), or which are situated in fixed positions, are made interchangeable and time-regulated. These colors, possessing definite color-arrangement and color-sequence, are intended either to express direction, signify protection or designate code-signalling; varieties of work—the correct and, at times, vital answers to which are dependent solely upon color recognition at distances which are

[1] Better, less complicated, and hence cheaper and more easily applied adaptations of the Hertzian Ray apparatus might accomplish the purpose in one way; but unfortunately, unless such instrumentation is automatic in action, and unless its management and use can be kept constantly correct, this method must be considered in the light of the future.

comparable with safety to large moving masses that often can be alone stopped slowly and gradually—colors and relative positions which must be carefully chosen in regard to distances, situations, etc.

In the following paragraphs it has been endeavored to express clearly and briefly the specific reasons for the improvements and changes suggested.

I. All of the color tints to be used both by reflected light-stimuli and transmitted light-stimuli (day and night) during actual duty, should be officially proven copies of standards which have been carefully chosen in such a way that the signals may be uniform in tint in spite of variations in the character of the illuminants themselves. These selections should be made by an international commission of normal-eyed color experts. The color-signals will then be universally alike, thus minimizing danger from confusion due to false color exposure.

These results can probably best be obtained by mathematically and analytically obtaining sample pigment hues, both for diffuse reflected solar light and diffuse refracted artificial light, of specified kinds, character, degrees and tints, which are equivalent to the midway bands for the colors used in the corresponding portions of the color spectra obtained during exposure to the illuminant to be employed during actual service.

II. Each vessel of any importance should be provided with proportionately-sized miniature samples of color-boxes, color-lamps, signal-colors, etc.,—or better, fitted with full-sized examples of the same,—all carefully protected and boxed. These should be used as guides for the tinting of all material which employs color as its basis for signalling of any kind. These materials should be certified by proper authority, and should be obtainable at cost at licensed shops in every port of any consequence.

III. It should be a part of the official duty of every national, state and municipal government to see that the materials which are used for color-signalling in any form, as well as the samples, are periodically examined as to cleanliness and stability of tint. Dated certificates, brief and to the point, with plain instructions for the easiest manufacture and the best plans for the preservation of the color materials, together with clearly expressed rules for distances used, situations employed, and notes on any color peculiarity

of certain places, should be given; these to be submitted for inspection on demand.

IV. Every series of related colors used should be regulated, both as to their comparative sizes of exposure and the relative degrees of color saturation; these should be duly proportionate in reference to equalities, distinctness, relationships and association of safe distances, and with regard to differences in degrees of penetrability. This can be accomplished either by having the color values graded proportionately (a bad plan, since it tends to weaken the value of the stronger colors), or by making the color areas relative in size: for example, to give a green signal light a similar degree of brightness, and hence the same relative distinctness (which governs all apparent distances, and in consequence the relationships of the two colors), as red, it must either be five times more powerfully illuminated than the red or given five times more exposed superficial area: so too with all other color changes; there is an idiocratic relationship. Clinical experiment has shown this, and laboratory research has confirmed the practical findings. The importance of this factor can hardly be overestimated when the series of individual signal colors are numerous in well-filled and busy harbors.

These plans once agreed upon by such an international commission, all necessary data will soon become common property, and in consequence the system will be universally understood.

Philadelphia, April 7, 1904.